

Claims

1.

1 A preform for blow molding a plastic container having a multilayer wall, which
2 includes:
3 at least one layer of matrix resin,
4 at least one layer of barrier resin, and
5 material blended with said barrier resin and/or said matrix resin to promote adhesion
6 between said barrier and matrix layers, said material including an amine polymer.

2.

1 The preform set forth in claim 1 wherein said amine polymer is an imine polymer.

3.

1 The preform set forth in claim 1 wherein said amine polymer is an alkylene amine
2 polymer.

4.

1 The preform set forth in claim 3 wherein said alkylene amine polymer is an
2 alkylene imine polymer.

5.

1 The preform set forth in claim 4 wherein said alkylene imine polymer is a
2 polyethyleneimine polymer.

6.

1 The preform set forth in claim 1 wherein said matrix resin is ester-containing
2 resin, polyolefin or polyamide.

7.

1 The preform set forth in claim 1 wherein said matrix resin is polyester resin.

8.

1 The preform set forth in claim 7 wherein said polyester resin is PET, PEN, a blend
2 or copolymer of PET and PEN, or regrind that includes PET, PEN or blends or copolymers of
3 PET and PEN.

9.

1 The preform set forth in claim 1 wherein said barrier resin is EVOH, polyamide,
2 acrylonitrile copolymers, a blend of EVOH and polyamide, a blend of polyester and polyamide, a
3 nanocomposite of EVOH or polyamide and clay, a blend of EVOH and an ionomer, acrylonitrile,
4 a cyclic olefin copolymer, polyglycolic acid, polyvinylidene chloride, or a blend thereof.

10.

1 A preform for blow molding a plastic container having a multilayer wall, which
2 includes:

3 at least one layer of polyester resin selected from the group consisting of PET,
4 PEN, blends or copolymers of PET and PEN, and regrind that consists essentially of PET, PEN,
5 or blends or copolymers of PET and PEN,

6 at least one layer of barrier resin selected from the group consisting of EVOH,
7 polyamide, acrylonitrile copolymers, blends of EVOH and polyamide, a blend of polyester and
8 polyamide, nanocomposites of EVOH or polyamide and clay, blends of EVOH and an ionomer,
9 acrylonitrile, cyclic olefin copolymers, polyglycolic acid, polyvinylidene chloride, and blends
10 thereof, and

11 a polyethyleneimine blended in at least one layer of barrier resin to promote
12 adhesion between said barrier and polyester layers.

11.

1 A plastic container having a multilayer wall that includes:
2 at least one layer of matrix resin,
3 at least one layer of barrier resin, and
4 a material blended with said barrier resin and/or said matrix resin to promote
5 adhesion between said barrier and matrix layers, said material including an amine polymer.

12.

1 The container set forth in claim 11 wherein said amine polymer is an imine
2 polymer.

13.

1 The container set forth in claim 11 wherein said amine polymer is an alkylene
2 amine polymer.

14.

1 The container set forth in claim 13 wherein said alkylene amine polymer is an
2 alkylene imine polymer.

15.

1 The container set forth in claim 14 wherein said alkylene imine polymer is a
2 polyethyleneimine polymer.

16.

1 The container set forth in claim 11 wherein said matrix resin is ester-containing resin,
2 polyolefin or polyamide.

17.

1 The container set forth in claim 11 wherein said matrix resin is polyester resin.

18.

1 The container set forth in claim 17 wherein said polyester resin is PET, PEN, a
2 blend or copolymer of PET and PEN, or regrind that includes PET, PEN or blends or copolymers
3 of PET and PEN.

19.

1 The container set forth in claim 11 wherein said barrier resin is EVOH,
2 polyamide, acrylonitrile copolymers, a blend of EVOH and polyamide, a blend of polyester and
3 polyamide, a nanocomposite of EVOH or polyamide and clay, a blend of EVOH and an ionomer,
4 acrylonitrile, a cyclic olefin copolymer, polyglycolic acid, polyvinylidene chloride, or blends
5 thereof.

20.

1 A plastic container having a multilayer wall that includes:
2 at least one layer of polyester resin selected from the group consisting of PET,
3 PEN, blends or copolymers of PET and PEN, and regrind that consists essentially of PET, PEN,
4 or blends or copolymers of PET and PEN,
5 at least one layer of barrier resin selected from the group consisting of EVOH,
6 polyamide, acrylonitrile copolymers, blends of EVOH and polyamide, a blend of polyester and
7 polyamide, nanocomposites of EVOH or polyamide and clay, blends of EVOH and an ionomer,
8 acrylonitrile, cyclic olefin copolymers, polyglycolic acid, and blends thereof, and
9 a polyethyleneimine blended in said at least one layer of barrier resin to promote
10 adhesion between said barrier and polyester layers.

21.

1 A barrier resin blend for use in a layered plastic article, said barrier resin blend
2 including:
3 a barrier resin to resist transmission of gas, water vapor or flavorants, and
4 a material that includes an amine polymer to promote adhesion between the
5 barrier resin and adjacent layers in a multilayer plastic article.

22.

1 The barrier resin blend set forth in claim 21 wherein said material is an alkylene
2 imine polymer.

23.

1 The barrier resin blend set forth in claim 22 wherein said material is a
2 polyethyleneimine polymer.

24.

1 The barrier resin blend set forth in claim 23 wherein said barrier resin is EVOH,
2 polyamide, an acrylonitrile copolymer, a blend of EVOH and polyamide, a blend of polyester and
3 polyamide, a nanocomposite of EVOH or polyamide and clay, a blend of EVOH and an ionomer,
4 acrylonitrile, a cyclic olefin copolymer, polyglycolic acid, polyvinylidene chloride or blends
5 thereof.

25.

1 A method of making a multilayer plastic container that includes:

2 (a) blending with a barrier resin, an adhesion-promoting material comprising
3 alkylene amine polymers, and

4 (b) forming a preform in which the blend formed in step (a) is in layers
5 alternating with layers of polyester resin, and in which said amine polymer promotes adhesion
6 between said barrier resin and said polyester resin.

26.

1 The method of claim 25 wherein said amine polymer is an alkylene imine
2 polymer.

27.

1 The method set forth in claim 25 further including: (c) blow molding the preform
2 formed in step (b) into a hollow plastic container.

28.

1 The method set forth in claim 27 wherein said step (b) is carried out while at least one
2 of said blend formed in said step (a) and said polyester resin is in melt phase.

29.

1 The method set forth in claim 28 wherein said step (b) is carried out by a process
2 selected from the group consisting of simultaneously injection molding said polyester resin and said
3 barrier resin blend, sequentially injection molding said polyester resin and said barrier resin blend,
4 overmolding sequential layers of said polyester resin and said barrier resin blend, compression
5 molding a mold charge that includes said polyester resin and said barrier resin blend, and extruding
6 a hollow tube that includes alternate layers of said polyester resin and said barrier resin blend.

30.

1 The method set forth in claim 29 wherein said adhesion-promoting material is a
2 polyethyleneimine polymer

31.

1 The method set forth in claim 30 wherein said polyester resin is PET, PEN, a blend
2 or copolymer of PET and PEN, or regrind that includes PET, PEN, or blends or copolymers of PET
3 and PEN.

32.

1 The method set forth in claim 25 wherein said barrier resin is EVOH, polyamide, an
2 acrylonitrile copolymer, a blend of EVOH and polyamide, a blend of polyester and polyamide, a
3 nanocomposite of EVOH or polyamide and clay, a blend of EVOH and an ionomer, acrylonitrile,
4 a cyclic olefin copolymer, polyglycolic acid, polyvinylidene chloride, or blends thereof.

33.

1 A multilayer article, which includes:
2 at least one layer of matrix resin,
3 at least one layer of barrier resin, and
4 material blended with said barrier resin and/or said matrix resin to promote adhesion
5 between said barrier and matrix layers, said material including an amine polymer.

34.

1 The article set forth in claim 31 wherein said matrix resin is ester-containing resin,
2 polyolefin or polyamide.

35.

1 The article set forth in claim 34 wherein said ester-containing resin is polyester resin.

36.

1 The article set forth in claim 35 wherein said polyester resin is PET, PEN, a blend or
2 copolymer of PET and PEN, or regrind that includes PET, PEN or blends or copolymers of PET and
3 PEN.

37.

1 The article set forth in claim 33 wherein said amine polymer is an alkylene amine
2 polymer.

38.

1 The article set forth in claim 37 wherein said alkylene amine polymer is an alkylene
2 imine polymer.

39.

1 The article set forth in claim 38 wherein said alkylene imine polymer is a
2 polyethyleneimine polymer.

40.

1 The article set forth in claim 33 wherein said barrier resin is EVOH, polyamide, an
2 acrylonitrile copolymer, a blend of EVOH and polyamide, a blend of polyester and polyamide, a
3 nanocomposite of EVOH or polyamide and clay, a blend of EVOH and an ionomer, acrylonitrile,
4 a cyclic olefin copolymer, polyglycolic acid, polyvinylidene chloride, or blends thereof.

41.

1 A method of making a multilayer plastic article that includes:

2 (a) blending with a barrier resin, an adhesion-promoting material comprising an
3 amine polymer, and

4 (b) forming an article in which the blend formed in step (a) is in layers alternating
5 with layers of matrix resin, and in which said amine polymer promotes adhesion between said barrier
6 resin and said matrix resin.

42.

1 The method set forth in claim 41 wherein said step (b) is carried out while at least one
2 of said blend formed in said step (a) and said matrix resin is in melt phase.

43.

1 The method set forth in claim 42 wherein said amine polymer is an alkylene imine
2 polymer.

44.

1 The method set forth in claim 43 wherein said alkylene imine polymer is a
2 polyethyleneimine polymer.

45.

1 The method set forth in claim 41 wherein said matrix resin is an ester-containing
2 resin, polyolefin or polyamide.

46.

1 The method set forth in claim 41 wherein said matrix resin is a polyester resin.

47.

1 The method set forth in claim 46 wherein said polyester resin is PET, PEN, a blend
2 or copolymer of PET and PEN, or regrind that includes PET, PEN, or blends or copolymers of PET
3 and PEN.

48.

1 The method set forth in claim 41 wherein said barrier resin is EVOH, polyamide, an
2 acrylonitrile copolymer, a blend of EVOH and polyamide, a blend of polyester and polyamide, a
3 nanocomposite of EVOH or polyamide and clay, a blend of EVOH and an ionomer, acrylonitrile,
4 a cyclic olefin copolymer, polyglycolic acid, polyvinylidene chloride, or blends thereof.

49.

1 A packaging component having a plastic resin wall that includes an alkylene imine
2 polymer that resists migration of carbon dioxide through said resin wall.

50.

1 The packaging component set forth in claim 49 wherein said alkylene imine polymer
2 is a blend with another plastic resin in said wall.

51.

1 The packaging component set forth in claim 49 wherein said wall is a multilayer wall
2 having at least two plastic resin layers, and wherein said alkylene imine polymer is in one of said
3 layers.

52.

1 The packing component set forth in claim 51 wherein said alkylene imine polymer
2 is blended with another plastic resin in said one layer.

53.

1 The packaging component set forth in claim 52 wherein said alkylene imine polymer
2 is a polyethyleneimine polymer.

54.

1 The packaging component set forth in claim 52 wherein said other plastic resin is a
2 barrier resin that is EVOH, polyamide, acrylonitrile copolymers, a blend of EVOH and polyamide,
3 a blend of polyester and polyamide, a nanocomposite of EVOH or polyamide and clay, a blend of
4 EVOH and an ionomer, acrylonitrile, a cyclic olefin copolymer, polyglycolic acid, polyvinylidene
5 chloride, or a blend thereof.

55.

1 The packaging component set forth in claim 54 wherein another of said at least two
2 layers includes polyester resin.

56.

1 The container set forth in claim 55 wherein said polyester resin is PET, PEN, a blend
2 or copolymer of PET and PEN, or regrind that includes PET, PEN or blends or copolymers of PET
3 and PEN.

57.

1 A method of making an article, which includes blending an alkylene imine polymer
2 with another plastic resin to form said article that resists migration of carbon dioxide through said
3 sidewall.

58.

1 The method set forth in claim 57 wherein said other plastic resin is a barrier resin that
2 is EVOH, polyamide, acrylonitrile copolymers, a blend of EVOH and polyamide, a blend of
3 polyester and polyamide, a nanocomposite of EVOH or polyamide and clay, a blend of EVOH and
4 an ionomer, acrylonitrile, a cyclic olefin copolymer, polyglycolic acid, polyvinylidene chloride, or
5 a blend thereof.

59.

1 The method set forth in claim 58 wherein said wall is a multilayer wall having at least
2 two plastic resin layers, and wherein said alkylene imine polymer is in one of said layers.

60.

1 The method set forth in claim 59 wherein an other of said at least two layers includes
2 polyester resin.

61.

1 The method set forth in claim 57 wherein said alkylene imine polymer is a
2 polyethyleneimine polymer.